

# **GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE - SEMESTER- V(OLD) EXAMINATION - SUMMER 2019** 

Subject Code:150902

Subject Name:Power System Analysis And Simulation Time:02:30 PM TO 05:00 PM

**Total Marks: 70** 

Date:17/06/2019

Instructions:

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- Q.1 (a) State and advantages of per unit system.
  - (b) Derive the ABCD constants for nominal  $-\pi$  representation of medium length 07 transmission line.
- Q.2 (a) Explain Sub-Transient, Transient and Steady State reactance of synchronous 07 machine.
  - (b) Write a brief note on selection of circuit breaker.

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#### OR

- (b) A 50 Hz transmission line 300 km long has a total series impedance of (40 + j) 07 125) ohms and a total shunt admittance of  $10^{-3}$  mho. The receiving end load is 50 MW at 220 kV with 0.8 lagging power factor. Find the sending end voltage and current using exact method.
- Q.3 (a) Derive the relationship between symmetrical components of line and delta 07 currents.
  - (b) A generator is rated 1000 MVA, 11 KV. Its star connected winding has reactance of 0.9 PU Find (1) Ohmic value of reactance (2) If the generator is working in a circuit for which the base values are specified as 250 MVA, 22 KV, find out its PU reactance on the specified base.

#### OR

- Q.3 (a) Derive the equation of the capacitance of a three phase line with equilateral 07 spacing.
  - (b) Explain 'type 2 modification' of Zbus building algorithm. 07
- Q.4 (a) Derive an expression for the fault current for a double-line fault as an unloaded 07 generator.
  - (b) A synchronous generator is rated 25 MVA, 11 kV. It is star connected with neutral point solidly grounded. The generator is operating on no-load at rated voltage. Its reactances are X'' = X2 = j0.20 pu and X0 = j0.08 pu. Calculate the symmetrical sub transient line current for (i) LG fault (ii) LL fault (iii) LLG fault (iv) LLL fault

### OR

- Q.4 (a) Explain the need of neutral grounding of system. Describe any one method of 07 neutral grounding.
  - (b) Discuss corona formation phenomenon.
- Q.5 (a) Derive the equation for attenuation of a travelling wave. 07
  - (b) A 500 kV,  $2\mu$ S, rectangular surge travels along the line which is terminated by a capacitance of 2500 pF. Determine the voltage across the capacitance and the reflected voltage wave if the surge impedance is 400 $\Omega$ .

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- Q.5 (a) What is bus impedance matrix? How it is useful in symmetrical fault analysis? 07
  - (b) Briefly explain the importance of power circle diagrams. Draw and explain the 07 receiving end circle diagram for a transmission line.

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